

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Carrier Current Systems, including)	ET Docket No. 03-104
Broadband over Power Line Systems)	
)	ET Docket No. 04-37
Amendment of Part 15 regarding new)	
requirements and measurement)	
guidelines for Access Broadband over)	
Power Lines Systems)	

REPLY COMMENTS OF THE UNITED POWER LINE COUNCIL

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SUMMARY

The FCC proposals strike a fair balance between caution towards BPL and support for it. The UPLC appreciates the concerns about interference, and it supports the Commission's common sense, pragmatic approach towards BPL deployment. However, it cannot support and will not support the highly prescriptive and unreasonable approach taken on the record by the NTIA. This approach is fundamentally at odds with the Part 15 rules, and is unjustified by the interference potential of BPL operations. Moreover, it would frustrate the larger public interest in the development and deployment of BPL systems to promote meaningful access and competition in the broadband market.

Although there are widely divergent views about BPL interference, one thing is undisputed: it is an unlicensed operation and an unintentional radiator. This incontrovertible fact means that BPL operations may not cause interference to and must accept interference from authorized operations. It also means that BPL operates at power levels that are extraordinarily low relative to the power levels of authorized operations. These levels have been codified under Part 15 and a broad class of carrier current systems have operated in compliance with these limits for decades – without interference.

Common sense dictates that BPL operations within these limits constitute no more of a threat of interference than other carrier current systems. Actually, BPL represents even less of a threat because it operates as an unintentional radiator, whereas other carrier current systems such as campus radio stations act as intentional radiators by using power lines as broadcast antennas.

Moreover, unlike most other Part 15 operations, BPL devices are fixed and locatable – any interference that does occur can be readily traced and remedied more easily than most Part 15 operations. Of course NTIA would agree with the existing emission limits – how could it not?

Instead of attacking the limits themselves that have demonstrably prevented interference for decades, the NTIA seeks to change the terms under which BPL may demonstrate compliance with those limits. As such it recommends measuring for peak field strength all across the HF band along the entire length of the power line, adjusting measurements upwards by 5 dB, and threatening to reduce power as much as another 20 dB through mandatory power control.

Similarly it recognizes that BPL is an unintentional radiator, but recommends measures that would treat BPL as if it were a licensed operation with all its obligations but without any commensurate rights. Hence it recommends *inter alia* prior-coordination requirements, zones of exclusion and bands of exclusion, equipment certification and sundry reporting obligations.

To reiterate – BPL is not a licensed operation and it doesn't even intentionally emit RF. The threat of interference from BPL to authorized operations in the HF band is negligible and certainly does not merit the NTIA's recommendations for reducing the risk of interference. Moreover, those recommendations represent a fundamental departure from the Part 15 rules, ultimately manifested by NTIA's own recommendation for creating a subpart of the Part 15 rules for BPL. This is overkill literally and figuratively.

Moreover, we question the basis upon which the NTIA has arrived at its recommendations. Trials of BPL have been ongoing for years and some of them now pass thousands of homes and businesses in areas where HF licensees operate. Some of the trials include end-users that are HF licensees. Only a handful of complaints of credible harmful interference have occurred, most of which have been remedied relatively easily through the very mitigation techniques that the FCC has proposed in this proceeding. The absence of complaints is consistent with our painstaking measurements and exhaustive analysis of BPL under a variety of conditions and network architectures, all of which comply with the Part 15 rules and consistently show very low emission levels characterized by a sharp decay in signal strength as distance increases from the source of the emissions, which has been primarily at the point of injection rather than from the power lines or discontinuities. By contrast, NTIA reports non-monotonic power levels that decay gradually and erratically. We have some ideas how NTIA reached these findings, but the report itself is so vague it is difficult to definitively explain their differences.

The UPLC does agree with NTIA on one point: BPL has been studied to death already and no further delay in promulgating rules is necessary or appropriate. We look forward to resolving our dramatic differences with NTIA's findings and recommendations, but regardless, the Commission should proceed expeditiously to develop the rules it has proposed, which are more than adequate to safeguard against the potential of interference from BPL.

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COMMENTS OF THE UNITED POWER LINE COUNCIL

Pursuant to Section 1.415 of the Federal Communications Commission (“FCC”) Rules, the United Power Line Council (“UPLC”) hereby submits its reply comments in response to the Notice of Proposed Rule Making in the above referenced proceeding.¹

The UPLC has grown accustomed to criticism from biased opponents of BPL, but it frankly expected that the NTIA would provide an objective viewpoint that would debunk theories about interference with accurate measurements and detailed recommendations about the actual interference potential of BPL. Unfortunately, the NTIA perpetuates, if not compounds the confusion that exists about BPL interference, and it makes recommendations that are alternatively

¹ *Carrier Current Systems, including Broadband over Power Line Systems*, Notice of Proposed Rule Making, ET Docket No. 04-37, 2004 WL 324486 (“*BPL NPRM*”).

excessive or bizarre. As more fully described below, the results of the various BPL trials contradict the findings by the NTIA, and the FCC should not adopt any of NTIA's recommendations based on its questionable findings.

Instead, the UPLC reiterates its support for retaining the existing radiated emission limits for an interim period, integrating adaptive interference mitigation techniques into equipment on a going-forward basis after a reasonable transition period of two years, limiting disclosure of information on the BPL database to provide adequate notification of existing BPL deployments, and adopting measurement guidelines for overhead and underground installations consistent with the proposals but basing compliance upon the overall emissions of the system rather than each individual device. The UPLC believes that these proposals are reasonable under the circumstances and can be implemented without undue cost, delay or administrative burden, thereby ensuring that the public interest in broadband access and competition and improved electric service will be served.

I. Benefits of BPL

The Commission has recognized that the public interest benefits in BPL outweigh the concerns about potential interference from retaining the existing emission limits.² As such, it bears repeating that BPL would provide many public interest benefits, both in improved energy efficiency and reliability as well as broadband access and competition.

² *BPL NPRM* at ¶ 33 (stating that on balance that the benefits of BPL for bringing services to the public are sufficiently important and significant as to outweigh the potential for increased harmful interference that might arise).

A. Utility Applications

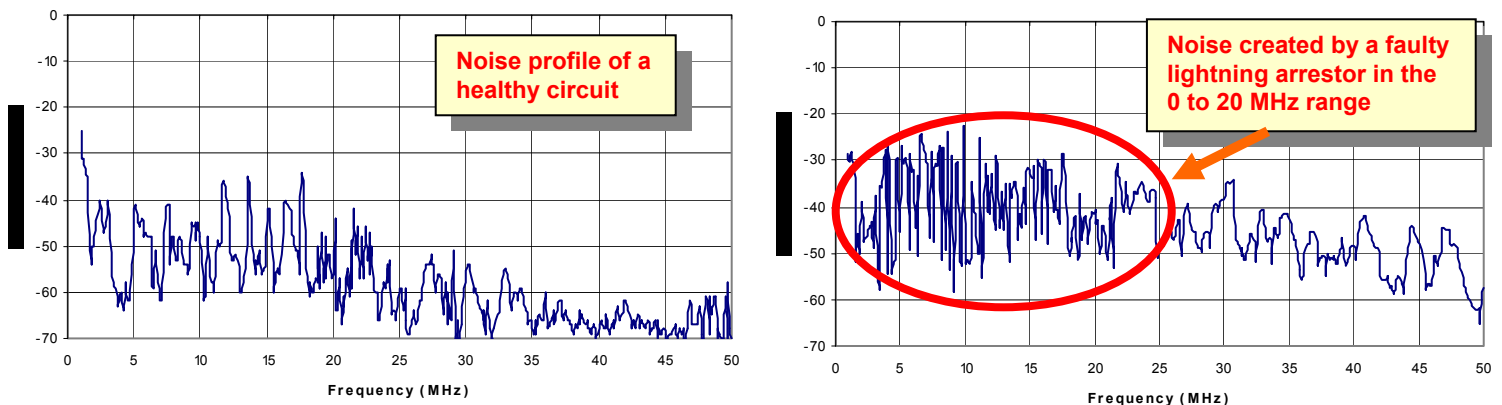
Access BPL enables enhanced energy services through applications such as load management, demand side management, power quality monitoring, real-time two way automated meter reading, automatic connect and disconnect, automated power outage and restoration detection, system security, and voice over IP.³ These kinds of applications are an attractive feature of BPL for utilities, and should be for the public too.

For example, utilities do have extensive communications facilities for monitoring and controlling their transmission networks. But most do not extend beyond the substation. Moreover, the systems that do extend beyond the substation are typically slow speed, one-way communications. Hence, when the power goes out, utilities are metaphorically in the dark too about the precise location of the outage. Relying on customers to notify utilities about outages is an inefficient industry practice that could be eliminated using BPL.⁴ Not only would BPL enable utilities to see where an outage had occurred by monitoring the BPL devices, but it also could enable utilities to anticipate faults that could

³ See e.g. Comments of Southern LINC, Southern Telecom, Inc., and Southern Company Services, Inc. at 4-6 (filed May 3, 2004)(“Comments of Southern”); Comments of Cinergy at 2 (filed May 3, 2004); Comments of the City of Manassas, Virginia at 3 (filed May 3, 2004)(“Comments of Manassas”); and Comments of Current Technologies, LLC at 11-12 (filed May 3, 2004).

⁴ *Accord*, Comments of NTIA at 6 (stating that with widespread deployment of Access BPL, it will be possible to speed detection and diagnosis of electrical system failures and there likely will be increased demand and revenue subsidies for qualified electric system repair and maintenance personnel and equipment.)

occur by monitoring the BPL signals on the lines. Faults are evident by anomalies in radio frequency patterns as illustrated below.⁵



This is just one example of how BPL could improve efficiency and promote public safety and welfare at the same time. Other applications for load management and demand side control could reduce or forestall the need for additional generation facilities, thereby saving potentially millions of dollars of investment.⁶

B. Commercial Applications

Of course BPL will also promote broadband access and competition for consumers, carriers and ISPs; but it also enables applications in ways that other broadband platforms do not.⁷ As Current Technologies observes, “broadband is not yet a reality for everyone.” The rate of deployment of advanced service lines

⁵ Source: Presentation by Tim Frost, Consolidated Edison at UTC Telecom 2004, Nashville, TN (May 19, 2004).

⁶ *Id.* at 12 (estimating \$40 million plus cost savings to CECONY from being able to delay investment in new substation construction because of energy efficiencies gained from BPL)

⁷ See *generally* Comments of AT&T Corp. at 2-4 (filed May 3, 2004) and Comments of LecStar Telecom and LecStar DataNet, Inc. at 3-4 (filed May 3, 2004)(describing BPL as a “valuable” alternative access platform with “enormous potential”).

has declined over the last year, and more than half these lines are cable modem and another third are ADSL.⁸ Moreover, there are no advanced services lines at all in 7% of the zip codes in the country, and another 15% are served only by one provider.⁹

BPL offers not only an alternative broadband platform for many of these unserved and underserved areas of the country, but additional features such as home networking, plug-and-play access, symmetrical speeds, and low latency. BPL supports a variety of applications, such as voice-over-IP and video services that are currently being offered or will be offered commercially in the near future.¹⁰ Speeds on BPL are comparable to or better than other broadband platforms, and the services are being offered affordably.¹¹ Finally, BPL makes

⁸ See *High-Speed Services for Internet Access: Status as of June 30, 2003*, Industry Analysis and Technology Division Wireline Competition Bureau at Tables 4, 6 (released December 2003)(showing that the rate of deployment of advanced services lines slowed from 37% to 26% between December 2002 and December 2003, and that only 2,274,385 of the 28,230,149 advanced services lines were not cable or ADSL.) See also Comments of AT&T at 2 (stating that today's broadband marketplace is at best a duopoly of cable modem service and ILEC-provided DSL service.)

⁹ *Id.* at Table 12. Note also that the FCC considers a zip code served if any provider, including satellite, has one customer in it. *Id.* at Table 13.

¹⁰ See Comments of Current Technologies, LLC at 8. See also Comments of Southern at 7 (reporting that VoIP and security monitoring have been successfully tested in BPL trials and will be offered commercially this year).

¹¹ See Comments of AT&T at 3 (citing NOI comments that demonstrate that BPL is capable of providing data speeds comparable to, or better than, those delivered via DSL or cable modem service); and "Progress Energy and Earthlink Testing Broadband Over Power Lines with Area Customers" at <http://www.progress-energy.com/aboutus/news/article.asp?id=8362> (announcing service rates of \$19.95 a month for the first three months and \$39.95 per month thereafter; and "BPL for Manassas" at

efficient use of existing infrastructure; and equipment can be deployed easily and redeployed as necessary, avoiding the risk of stranded investment that was the downfall of the “build it and they will come” bubble. These features offer a compelling basis for deploying BPL commercially on a mass-market scale.

Thus far BPL trials have yielded encouraging results, but utilities are concerned that all will go for naught because of onerous operational requirements that can “potentially undermine the applicability of Access BPL”, especially for utility services that cannot be interrupted.¹² Therefore, utilities are looking to the FCC to provide clear signals to encourage continued development and deployment of BPL services going forward.

II. Interference Potential of BPL

A. BPL acts like a point-source emitter; and only minimal emissions radiate from the power lines themselves.

The UPLC reiterates its support for the proposal to use the existing radiated emission limits, and encourages the FCC to revisit increasing the limits later.¹³ Utilities and technology providers generally support the Commission’s

<http://www.nbc4.com/technology/2765704/detail.html> (reporting service rate of \$26.95 a month).

¹² See e.g. Comments of Southern at 7 (stating that it is encouraged by results of its BPL trials so far); Comments of Consolidated Edison Company of New York at 3 (filed May 3, 2004)(Comments of CECONY)(citing large investment of resources and effort at stake in BPL and advising against imposing shut-down requirements to mitigate interference at the outset); and Comments of Oncor Electric Delivery Company at 1 (filed May 3, 2004)(citing considerable, widespread utility industry operational benefits from BPL in the long term).

¹³ The UPLC also continues to support an exemption from conducted emissions, which other comments universally support due to the inherent safety risks of electrocution.

proposal as a cautious approach and an interim solution to enable deployment to proceed while protecting licensees from interference.¹⁴ Although the UPLC appreciates NTIA's support of the existing emission limits as well, we disagree that the emission limits cannot be relaxed without risking interference.¹⁵

All of the comments from the industry report that power lines are very inefficient antennas, and that they tend to act like point source radiators.¹⁶ Moreover, they consistently characterize emission propagation by signal levels that decay sharply and steadily as distance increases away from the device, consistent with the Commission's tentative conclusions.¹⁷ Finally, we have never

¹⁴ See Comments of Duke Energy Corporation at 13 (filed May 3, 2004); Comments of Southern at 15-17; Comments of PPL Telcom, LLC at 4; Comments of Progress Energy, Inc. at 5; and Comments of Southern at 15-16 (requesting reevaluation of the existing radiated emission limits soon after the industry has demonstrated that the interference potential of BPL deployments is marginal.). See *also* Comments of AT&T Corp. at 4 (filed May 3, 2004); Comments of Main.net Communications Ltd. at 5-6 (filed May 3, 2004).

¹⁵ U.S. Department of Commerce, Potential Interference from Broadband over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7-80 MHz, Phase 1 Study Volume I at vi (filed Apr. 27, 2004) ("NTIA Phase 1 Study").

¹⁶ See Comments of PowerWAN at 2 (filed May 3, 2004); Comments of Current Technologies, LLC at 14; Comments of Southern at 16-17; and Comments of Hawaiian Electric Co., Inc. at 3 (filed May 3, 2004) ("Comments of HECO") (emphasizing that it is highly improbable that the electric distribution network would become one continuous, aggregated antenna that will cause widespread interference).

¹⁷ See Comments of Ameren at 6 (agreeing with the assessment of the Commission that (a) radiated emissions from Access BPL devices decrease rapidly with the distance from the devices; (b) emergency and public safety systems use receivers with relatively low sensitivity; and (c) the potential of interference caused by Access BPL is implicitly low). *And see* Comments of Progress at 10-29.

seen emissions at discontinuities that exceed the emissions at the device. The principal source of emissions is the point of injection, and even those emissions are minimal.¹⁸

These consistent field measurements by entities independent from one another at different BPL deployments throughout the country contradict the findings by NTIA that power lines radiate significantly and that emissions at discontinuities exceed emissions at the devices.¹⁹ Frankly because the Phase I Study so vaguely describes the testing system used, we are left to speculate how the NTIA found such substantially fluctuating, non-monotonic decreases in emissions in the 7 MHz and 28 MHz bands at increasing distances from BPL devices.²⁰

One theory centers around NTIA's use of a whip antenna. In the Phase 1 Study, NTIA recommended using a rod antenna for measurements below 30

¹⁸ See *BPL NPRM* at ¶ 36 (stating that the primary source of emissions will be the individual couplers, repeaters and other devices, *and to a lesser extent* the power lines immediately adjacent thereto); *But see*, Comments of NTIA at 18 (stating that their measurements and analyses show that in most cases, peak field strength levels are not centered on the BPL device and multiple segments of the power lines and impedance discontinuities are the most significant BPL signal radiating elements)

¹⁹ See NTIA Phase 1 Study at Section 5.

²⁰ See NTIA Phase 1 Study at Appendix D, D-27-28 (exhibiting significant variations in emissions on the order of 8 dB at distances between 100-500 feet from the line at 28.809 MHz) See also, NTIA Phase 1 Study at Appendix D, Section D2 (providing a sketchy written description of the measurement system used and only a picture of the outside of the truck without a picture of the actual equipment inside it).

MHz.²¹ Even in its Phase 1 Study, the NTIA recognized that magnetic loop antennas produce more consistent and repeatable measurements.²² Thus in its Comments, NTIA recanted and recommended using a magnetic loop antenna with a magnetic-to-electric conversion factor (which is at yet undetermined).²³ We agree with the NTIA that the use of the whip antenna would produce varying measurements, contrary to the FCC's goal of producing guidelines that are consistent and repeatable.²⁴ Now that NTIA has seen the light, the question becomes whether that undermines the basis for its findings as a whole and its recommendations, which respond to these kind of worst-case scenarios. We believe that it does. The Commission was right when it tentatively concluded that BPL will not cause power lines to "act as countless miles of transmission lines all radiating RF energy along their full length."²⁵

Even if NTIA's measurements are confirmed, the interference appears to be limited to certain discrete frequencies, and it is not clear how widespread it is

²¹ See NTIA Phase 1 Study at Volume I, Section 7.8 (recommending using a calibrated rod antenna for measurements below 30 MHz because they are more sensitive to electric fields).

²² *Id.*

²³ See Comments of NTIA at 22 (stating that measurements below 30 MHz should use a calibrated loop antenna because it recognized that in the near field, such as at the ten-meter recommended measurement distance, wave impedance measurements may vary from 1 ohm to 2,000 ohms at various locations).

²⁴ See *Inquiry Regarding Carrier Current Systems, Including Broadband over Power Line Systems*, Notice of Inquiry, ET Docket No. 03-104, 18 FCC Rcd. 8498 at ¶ 23 (2003) ("BPL NOI").

²⁵ See *BPL NPRM* at ¶ 36.

on each BPL system.²⁶ If interference is limited to discrete frequencies and locations on the network, it would make more sense to determine the cause of these anomalies, rather than to impose restrictions that apply to all frequencies in all circumstances. If there is any “rush to judgment” in the proceeding, adopting recommendations based on worst-case scenarios would be it. Therefore, the Commission should refrain from adopting NTIA recommendations, if at all, until the findings by the NTIA can be investigated and less restrictive recommendations considered.

B. Emissions at the height of the power line are not significantly greater than those measured at 1-4 meters above ground.

Similarly, we dispute the NTIA’s findings with respect to emissions at power line height. The NTIA asserts that the emissions at a 10 meter height are “always larger than the power measured at 2 meter height (by 3-9 dBm).” By contrast, although we have found some increase at power line height, the increase has been far less than reported by NTIA.²⁷ Again, we can partially explain how NTIA’s measurements were higher: It actually measured nearer the

²⁶ See e.g. NTIA Phase 1 Study at Appendix D, Table D-9 (indicating that emissions from many frequencies were not measurable at relatively short distances from the power lines.)

²⁷ See Comments of Ameren at 19 (reporting that the rise of the field above the value measured at 1 meter AGL over all the distances from the source is no greater than 4 dB.) These findings are consistent with measurements at other BPL deployments, some of which were conducted following the NTIA report in an effort to confirm their findings.

lines than it should have!²⁸ Extrapolating the difference in distance does yield a difference of 5 dB, but that does not fully explain how NTIA found an increase of as much as 9 dB. Nonetheless, it does raise questions about the validity of NTIA's measurements yet again.

C. BPL radiated emissions do not propagate to the extent NTIA claims.

Finally, we completely disagree with the propagation characteristics modeled by NTIA. UPLC member field tests have shown that the emissions for BPL systems are practically undetectable within very short distances away from the power line.²⁹ We have not seen anything on the order of hundreds of feet, as claimed by NTIA, and certainly nothing that would cause interference to licensed operations at those distances. In many cases, the BPL signal is so low that it is masked by the ambient noise in the area. It is not immediately clear how NTIA found BPL emissions at such extraordinary distances, but we are extremely skeptical of its results.³⁰

D. Cumulative emissions do not appear to be an issue at the present time.

²⁸ See NTIA Phase 1 Study, Section 5.3.6 at 5-6 (stating "the antenna was located at 8.7 meters from the utility pole near the midpoint of the LV line" -- not 10 meters as specified by the FCC).

²⁹ See also *BPL NPRM* at ¶ 34 (stating that the FCC believes that the current Part 15 radiated emission limits will limit the harmful interference potential from BPL devices to relatively short distances around these devices).

³⁰ Although the industry did not participate in the testing with NTIA, there are anecdotal reports from industry witnesses suggesting that NTIA technicians may have been unaware that they were standing directly under a BPL device while attempting to measure emissions from devices hundreds of feet away.

The UPLC agrees with the FCC and NTIA that cumulative emissions have not been exhibited in the BPL deployments and are actually unlikely due to a variety of factors. As PPL explains, any cumulative effect of BPL emissions will be significantly reduced by virtue of: 1) emissions below the Part 15 limits; 2) equipment operating within the same network on different frequencies; 3) equipment deployed in different orientations with random polarization; 4) differences in emission characteristics of overhead and underground equipment; and 5) different phase displacements by BPL equipment operating on the same frequency.³¹ Therefore, we support the FCC and NTIA views that this is not a near-term issue that should delay the adoption of BPL rules.³²

III. Effectiveness of Mitigation Techniques

The UPLC reiterates its conditional support for the FCC's proposals for additional safeguards to mitigate against possible interference from BPL operations. The UPLC believes that interference can be effectively mitigated by the various techniques suggested by the Commission,³³ such as frequency

³¹ See *also* Comments of UPLC at 5 (filed May 3, 2004).

³² See *BPL NPRM* at ¶ 36 (citing evidence from Ameren and Southern that indicate that emissions are confined to immediate vicinity of deployment and citing comments by Main.net, Current and other access BPL manufacturers stating that only a limited number of devices transmit on the same frequency simultaneously). *And see* Comments of NTIA at ix (concluding that only a 1 dB increase in median radio noise power at any location -- globally -- might result under the current BPL rules, even if hundreds of thousands of Access BPL devices were deployed nationally. It also concluded that it would take millions of Access BPL devices to cause a 1 dB increase, if NTIA's recommendations were adopted).

³³ See *e.g.* Comments of PPL Telcom at 6 (reporting that since initiating BPL operations in February 2002, PPL Telcom has experienced three informal

shifting and frequency notching. However, such a requirement should not be effective retroactively or immediately, which would impose undue costs and delay to retrofit and retool equipment that has already been deployed or is being developed. Grandfathering existing equipment and providing a reasonable transition period of two years for new equipment will encourage the deployment of BPL services now and protect investment in new equipment.³⁴ At the same time, a notification mechanism in the form of a BPL database is reasonable, if disclosure of information is limited and is posted after a BPL system is deployed. This will ensure that licensees will be able to contact the local BPL operator to investigate interference, but prevent the database from being used for competitive or malicious purposes.³⁵

A. *A priori* mitigation and notification/coordination of BPL deployments is unreasonable in theory and unworkable in practice.

Under Part 15, the emission limits act as the front line of defense against interference and provide certainty to licensees and unlicensed operators alike, which protects the rights of licensees to communicate and encourages

interference complaints, all of which were addressed in a timely manner by relocating the BPL frequencies of nearby equipment to spectrum not allocated to the authorized users. Two of the complaints have been resolved and PPL Telcom is continuing to investigate the third.)

³⁴ *Accord* NTIA Phase 1 Study recommendation at 9.3.3; *and* Comments of Sprint at 4 (supporting 18 month-2 year transition period for equipment compliance with mitigation capabilities). *See also* Comments of the American Public Power Association at 6-7 (filed May 3, 2004); Comments of Current Technologies LLC at 19-20; Comments of Duke Energy at 11-12; Comments of Main.net at 7; Comments of PowerWAN at 2; and Comments of Southern at 19-20.

investment and innovation in new unlicensed technologies. Ordinarily, an unlicensed operation is only required to comply with those emission limits, but in the case of BPL, the Commission has proposed requiring BPL manufacturers to incorporate into their equipment the capability to adaptively mitigate any interference that might occur. In short, the mitigation techniques are a stop-gap in the event that the emission limits do not protect against interference.

The ARRL argues that mitigation techniques should be applied *a priori* to prevent interference from occurring, rather than remedying interference after the fact.³⁶ It contends that the mitigation techniques represent a departure from Part 15 rules, as if such techniques impose a burden on amateurs.³⁷ The UPLC agrees that the mitigation techniques do represent a departure to the degree that no other unlicensed operation has ever been required to incorporate such a capability into its equipment. But, it is clearly a benefit to the licensee and a burden to BPL. Moreover, the suggestion that BPL prevent interference to mobiles by notching down power to 0 dBuV/m at 10 meters is merely a transparent attempt to reopen the issue of the existing radiated emission limits.³⁸ The UPLC might be prepared to consider setting aside certain frequencies to protect mobile operations, but it is completely unreasonable to reduce power

³⁵ The BPL database could facilitate predatory pricing by competitors and malicious attacks by terrorists.

³⁶ Comments of ARRL at 11,19-24.

³⁷ See Comments of ARRL at 19.

³⁸ Comments of ARRL at 24. UPLC also disagrees with ARRL's call for independent testing prior to the initiation of operation at any location.

across the entire band on the off chance that a mobile might experience transitory interference.

Similarly, UPLC sees no foundation for the NTIA recommendation that BPL be required to coordinate operations *a priori* or provide notification to licensees at least thirty days in advance of deployment.³⁹ The geographic area and the amount of spectrum entailed are uncertain, but NTIA clarified that the coordination would apply to mobile receivers at frequencies above 30 MHz that routinely operate within the range of a known base station.⁴⁰ In that regard, it notes that a “mobile receiver operating via ionospheric signal propagation can be located virtually anywhere relative to a base station or other mobile stations with which it is communicating.”⁴¹ Taken to its extreme in this example, the coordination requirement could conceivably preclude BPL operations anywhere in the country at any frequency above 30 MHz.

As unreasonable as such a requirement would be, it is also practically unworkable considering the scope of the information that BPL operators would be required to submit in advance. BPL operators would be required to describe the size of the deployment by point-radius, the type of modulation and power control method, and the maximum number of each type of BPL device. Such a requirement would disclose far more information than is necessary to resolve interference complaints. Moreover, trying to predict the maximum number of

³⁹ See Comments of the NTIA at vi, 8-11.

⁴⁰ See Comments of NTIA at 10.

⁴¹ *Id.* at n. 19.

devices in a BPL deployment would be illusory due to changes in service areas and customer churn. As explained above, the UPLC believes that the database should be limited to basic location and contact information sufficient to provide adequate notice to licensees experiencing interference. The NTIA recommendations are beyond the pale.

B. Special protection of 41 frequencies by mandatory power control, coordination areas, excluded frequency bands and exclusion areas presents additional and uncertain challenges.

UPLC believes that NTIA takes the concept of *a priori* coordination even further and more excessively by recommending mandatory power control and adoption of limited coordination areas, excluded frequency bands, and exclusion zones to protect 41 frequencies that it claims are home to the “most sensitive and vulnerable Federal Government radio receivers.”⁴² The NTIA downplays the impact of protecting these frequencies, asserting that they collectively represent only 4.2 MHz of spectrum and 5.4% of the overall BPL bandwidth from 1.7 MHz to 80 MHz.⁴³ Although the UPLC is encouraged that the NTIA has limited these protections to certain coordination areas, bands and zones of exclusion, we have several issues with this concept in general.

⁴² Comments of NTIA at vi. See *a/so* NTIA Phase 1 Study at Section 4.

⁴³ See NTIA Phase 1 Study at Section 4.7.

First, most of these 41 frequencies are drawn straight from the ITU.⁴⁴ Why the NTIA is suddenly concerned about these frequencies is unclear. Section 15.205 of the Commission's Rules protects certain frequencies that are designated as "Restricted Bands of Operation", which includes very few of the frequencies recommended by NTIA. The FCC was presumably aware that the remaining frequencies were protected by the ITU, but chose not to incorporate them within Section 15.205. As such, NTIA's request seeks to amend Section 15.205, which is beyond the scope of this proceeding and would ordinarily require a formal petition.

Second, the Restricted Bands of Operation only apply to intentional radiators, and BPL is an *unintentional* radiator. Assuming that BPL was restricted from operating on these frequencies, it would create a double standard, not only with other Part 15 unintentional radiators, but also with other intentional radiators that are free to use these frequencies. Moreover, the NTIA does not justify imposing a higher standard on BPL than either intentional or other unintentional radiators.

Third, most of the frequencies are below 30 MHz, which are ideal for underground BPL installations due to inherent propagation characteristics. The operational impact of notching out those frequencies would be significantly detrimental to BPL operations. Moreover, the frequencies are narrowly spaced

⁴⁴ The remainder of the frequencies are protected from Part 80 (maritime) and 87 (aeronautical) services, which operate at much higher power. If these frequencies need only be protected from high power operations, it follows that the operations on those frequencies may not be vulnerable to low power unlicensed operations.

together, leaving very little usable spectrum in between such notches. In addition, masking around the notches would further reduce the amount of usable spectrum. Finally, NTIA implies that it would impose mandatory power control levels that reduce power by as much as 20 dB to protect Federal government receivers. Therefore, although the details of special protection measures remain unclear, indications are that they would have a significant impact in terms of cost and performance. The UPLC looks forward to working with the NTIA to reach a reasonable compromise between protection of these frequencies and promoting the deployment of BPL.

C. Mitigation techniques should be reasonable and avoid unnecessary costs and service interruption.

The UPLC agrees that BPL operators must make reasonable efforts to mitigate interference, but the NTIA and ARRL have clearly unrealistic expectations. ARRL demands that BPL operators be able to resolve interference 24 hours a day, 7 days a week, immediately upon receipt of a complaint;⁴⁵ and maintain a database that is publicly accessible by amateurs.⁴⁶ Moreover, they advocate system shutdown to mitigate interference, and express complete disregard for the cost and the impact on BPL services.⁴⁷ The NTIA is almost as extreme, recommending that the BPL operator temporarily shut down to test for

⁴⁵ Comments of ARRL 24.

⁴⁶ Comments of ARRL at 23. *See also* Comments of API at 8

⁴⁷ See e.g. Comments of ARRL at 20,22; Note that Sections 15.19 and 15.105 already require a notification to what ARRL requests, making its demand redundant and/or moot.

interference at the time a complaint was called in or shortly thereafter by a mutually agreed schedule.⁴⁸ Such a temporary shutdown test would interrupt communications for an extended period while the system resynchronized. Moreover, it would kill consumer confidence in BPL services and jeopardize critical infrastructure.

As the FCC and even NTIA acknowledge, BPL operators have strong incentives to remedy interference.⁴⁹ The Commission should not impose strict requirements and onerous administrative obligations with regard to resolving interference complaints.⁵⁰ BPL database information should be limited to basic contact information.⁵¹ As the UPLC and others have commented, shutdown should be a last resort in interference mitigation.⁵² Moreover, the existing radiated emission limits make it unlikely that resorting to mitigation will be necessary very often. The pragmatic, flexible approach proposed by the FCC is appropriate to provide adequate safeguards in the event that interference does occur in spite of compliance with the radiated emission limits.

⁴⁸ Comments of NTIA at 13.

⁴⁹ *BPL NOI* at ¶38; Comments of NTIA at 13.

⁵⁰ See Comments of Southern at 18 (stating it is unnecessary to adopt specific operational requirements for Access BPL since Part 15 already provides a strong incentive to avoid causing harmful interference to licensed services).

⁵¹ See Comments of the UPLC at 11-13; Comments of APPA at 7-9; Comments of Southern at 10-12; and Comments of Main.net at 7-8.

⁵² See Comments of CECONY at 6-8; Comments of the UPLC at 10; Comments of NTIA at viii; and Comments of Progress Energy at 6.

The UPLC is very concerned that the misinformation and outright lies by opponents of BPL that have been published in the press and on the Internet has created a level of hysteria among licensees about interference. This hysteria has already caused reputable organizations to express unfounded concerns about interference on the record in this proceeding.⁵³ If those organizations are caught up in the hysteria, individual licensees are even more apt to be. The Commission needs to establish ground rules to discourage frivolous complaints, whether in the form of enforcement actions against licensees that act in bad faith or allowing BPL operators to charge for investigating interference that is not caused by BPL. Otherwise, dealing with a large number of frivolous complaints may impose undue costs on operators and impede their ability and/or that of the Commission to remedy legitimate complaints of harmful interference.⁵⁴

Defining harmful interference may also be necessary to reduce frivolous complaints. Section 15.3(m) defines “harmful interference” as

any emission, radiation, or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunications service operating in accordance with this chapter.

⁵³ See e.g. Comments of American Petroleum Institute at 5 (accusing BPL of causing interference to an API member in Alaska, when in fact there has never been any BPL deployment in Alaska of which the UPLC is aware).

⁵⁴ As a precondition to filing a complaint with the FCC, the UPLC recommends that the Commission require that licensees provide documented evidence that they have made a good faith effort to work with the BPL operator to resolve the interference. See *also* Comments of PPL Telcom at 6 (recommending reciprocal obligation of good faith on both authorized spectrum users and BPL operators to promptly resolve harmful interference and to discourage frivolous complaints).

Unfortunately, this has not stopped amateur operators from complaining about even the slightest interference. Some seek out the interference and others use receivers that are particularly susceptible. In response, Progress Energy has asked that the FCC establish a four-part test for harmful interference designed to discourage frivolous complaints.⁵⁵ The UPLC supports this test, which is a reasonable and necessary response to an increasing problem. Coupled with sanctions as discussed above, this definition would weed out frivolous from legitimate complaints, thereby conserving Commission resources, promoting BPL deployment and ultimately serving the public interest.

IV. Equipment Authorization

With few exceptions, the Part 15 Rules only require that unintentional radiators comply with the verification process for equipment authorization.⁵⁶ This is in recognition of the fact that the interference potential from unintentional radiators is exceptionally low. BPL is an unintentional radiator, and should be subject to the verification procedure consistent with the Part 15 rules. Access BPL devices are professionally installed and maintained, and are unlikely to cause interference because of the extremely low emission limits under which they operate.

⁵⁵ The four-part test requires that the interference occur in the normal course of the complainant's operations, it should be more than momentary, it should be so great as to make communications practically unintelligible, and the receiver should meet certain standards for sensitivity.

⁵⁶ See 47 C.F.R. § 15.101 (2002).

The NTIA has recommended a radical revision to the Part 15 rules that would require BPL equipment to be certified by the operator, rather than verified by the manufacturer. This recommendation fundamentally departs from the Part 15 Rules in two respects. First, the operator of a device is never the responsible party, unless the operator modifies the equipment subsequent to manufacture or importation.⁵⁷ Second, equipment certification is generally reserved for intentional radiators, and BPL is an unintentional radiator.⁵⁸ Regardless, the Rules only require verification even for intentional radiators operated as carrier current systems.⁵⁹ Therefore, the NTIA recommendation contradicts both general and specific Part 15 Rules.

Moreover, imposing certification requirements on the operator would shift significant cost and liability, both with respect to compliance testing and enforcement action. The NTIA claims that these responsibilities “should be aligned and placed on Access BPL operators because they receive the BPL service revenue benefit and have strong incentives to ensure that interference risks are properly limited and technical standards are not violated.”⁶⁰ NTIA cites to no legal authority for this rationale: nor could it. Moreover, no useful purpose would be served by shifting responsibility to the operator, because the operator is already obligated to avoid causing interference under the Part 15 Rules. In

⁵⁷ See 47 C.F.R. § 2.909 (2002).

⁵⁸ See 47 C.F.R. § 15.201 (2002).

⁵⁹ *Id.*

⁶⁰ Comments of NTIA at 14.

addition, BPL operators would be understandably reluctant to certify equipment based on the testing of the manufacturer. In short, this recommendation is a zero-sum gain for purposes of preventing interference and will only discourage the deployment of BPL.

V. Measurement Guidelines

The UPLC amplifies its comments in support of the FCC's measurement guidelines, particularly in response to the NTIA recommendations, which would impose undue and severe burdens on BPL performance and operational administration. The UPLC continues to advocate measurements on overhead installations parallel to the power line at various distances from each BPL device and on underground installations at various radials from the devices. All of these measurements should be taken in accordance with the Part 15 Rules, at one to four meters above ground and at a distance of 10 meters away from the line.

The UPLC specifically opposes measuring for peak field strength at every frequency all along the power line and taking measurements at the height of the power line, or alternatively, using an adjustment factor for estimated increased signal strength at that height.⁶¹ Finally, demonstrating compliance must be reasonable and based upon three representative installations, and should allow

⁶¹ See *BPL NPRM* at Appendix C (proposing measuring at various distances from the device based on the wavelength of the frequency at 1-4 meters AGL only). *But see* Comments of NTIA at 16-21.

measurements to be extrapolated when it is impractical to conduct them from prescribed distances.⁶²

Instead of measuring at quarter wavelengths as proposed by the FCC, the NTIA recommends a “comprehensive search” for the overall peak field strength at the one-meter measurement height. It asserts that this should not amount to an undue burden. Although the NTIA is still studying this issue, the UPLC is concerned that such a requirement would amount to an undue burden because it would be extremely difficult as a practical matter to measure the entire BPL spectrum at every point along the line. Moreover, this burden would far outweigh any improvement over the measurement guidelines proposed by the FCC.

Similarly, the NTIA has recommended conducting measurements at power line height or using an adjustment factor of 5 dB for measurements taken at 1 meter AGL.⁶³ As explained above, the basis upon which this recommendation was reached is either misguided, fundamentally flawed or both. Moreover, as the IEEE Power System Relaying Committee underscores, “making this measurement at the height of the conductors without special personal protection devices, special test equipment, and a clear understanding of the hazards

⁶² See *BPL NPRM* at Appendix C (specifying that the distance correction factor shall be slant range and based upon the Commission’s extrapolation rules at Section 15.31(f)). *But see* Comments of NTIA at 16-17.

⁶³ Comments of NTIA at 19-20.

involved, is a dangerous recommendation.”⁶⁴ Therefore, the UPLC joins other comments on the record that strongly oppose this NTIA recommendation.⁶⁵

NTIA also would impose unreasonable standards by requiring measurements at the center of lines at least 600 meters in length that are devoid of impedance discontinuities.⁶⁶ Such requirements are frankly unrealistic. No such line exists. Even if one could be found, this standard is impractical, inflexible and unjustified by data from field trials, as more fully explained above. Similarly, NTIA recommends imposing reporting requirements that it asserts would “assist interference diagnosis”.⁶⁷ It is not clear whether ongoing reporting is appropriate, much less necessary to diagnose BPL interference. Arbitrary standards and reporting requirements such as these merely throw up roadblocks to deployment without serving any useful purpose in theory or fact. The UPLC can only wonder why the NTIA would suggest them.

Instead, the FCC should continue to find ways of developing consistent and repeatable measurement guidelines that encourage BPL deployment by providing regulatory certainty about BPL interference. The Commission should continue to allow BPL operators to extrapolate their measurements based on the current Part 15 Rules, not revise them as the ARRL and NTIA suggest. In

⁶⁴ Comments of the Power System Relaying Committee (“PSRC”) of the Institute of Electronic and Electrical Engineers (“IEEE”) at 3 (filed Apr. 30, 2004)(emphasis in original).

⁶⁵ Comments of Current Technologies at 25; and Comments of Southern at 22.

⁶⁶ NTIA Phase 1 Study at Section 7.9.

⁶⁷ Comments of NTIA at 24.

addition, the Commission should take a holistic approach towards compliance by allowing operators to offset emission measurements from each BPL device, rather than to require each device to comply with emission limits.⁶⁸

VI. Conclusion

BPL is an exciting technology with a promising future, but one that depends almost entirely on the Commission. BPL represents access for isolated communities that either have no choice of broadband provider or no access at all. BPL represents improved electric reliability and efficiency in ways that we are still exploring. The services supported by BPL offer enhanced functionality that are not available through other broadband platforms, including home networking, symmetrical speeds, low latency, network security, scalability, flexibility, and plug and play convenience. This is not just another broadband service, but a truly innovative technology. Best of all, it utilizes the existing infrastructure and the equipment can be installed on power lines in minutes. Moreover, unlike previous start-up services, utilities have the resources to bring BPL to market and to provide real competition against the cable-DSL duopoly. If universal affordable broadband access by 2007 is to be achieved, BPL is the best hope for realizing it.

For its part, the industry has demonstrated remarkable determination to overcome enormous technical obstacles to develop equipment for deployment in the U.S. Throughout trials, it complied with the rules, obtained experimental authority, and sought regulatory certainty in this proceeding. Throughout this

⁶⁸ See *BPL NPRM* at ¶ 45. See also Comments of UPLC at 14.

proceeding, it has addressed the issues and has refrained from being sidetracked by naysayers. These are responsible and reputable companies that have devoted years of diligent effort and personal self-sacrifice to make this dream a reality. These are the experts on BPL, not a misinformed set of armchair amateurs that still use vacuum tube transmitters.

The UPLC appreciates the work of the NTIA to study BPL and recommend ways to promote its development. Unfortunately, we cannot concur with most of its findings or its recommendations. The findings clearly overstate the threat of interference from BPL, and make recommendations that are based on worst-case scenarios. The practical effect of these recommendations would significantly impair performance and place undue administrative burdens on BPL operations. The nascent BPL industry will continue to work with NTIA to review its findings and develop appropriate recommendations, but the Commission must not rely on the NTIA study or adopt its recommendations at this time.

Instead, the Commission should continue to promote BPL deployment through a pragmatic approach that fairly balances the significant public interest benefits in BPL against the minute risk of interference to licensed operations. Compliance with the existing radiated emission under the Commission's slightly revised measurement guidelines should prevent interference from occurring. Any interference that does occur can be effectively mitigated. The Commission need not and should not adopt more stringent requirements, which will only serve to delay BPL deployment or prevent it altogether.

WHEREFORE, THE PREMISES CONSIDERED, the UPLC urges the
FCC to adopt its recommendations as described herein.

Respectfully submitted,

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